# First Year Of Terra Global Fluxes

Takmeng Wong, Bruce Wielicki, and Dave Young
NASA Langley Research Center, Hampton, VA

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# OBJECTVIES

- Illustrate The First Full Year* Of Daily Mean and Monthly Mean Terra Global Fluxes From The Archival CERES ERBE-like Edition1 Dataset.
- Compute Annual Mean CERES/Terra Global Fluxes From Monthly Mean Data.
- Contrast These CERES/Terra Results With The First Full Year** Of ERBE/(NOAA9+ERBS) Global Fluxes.

* First Full Year Of CERES/Terra Data: 03/01/2000 To 02/28/2001

** First Full Year Of ERBE/(NOAA9+ERBS) Data: 03/01/1985 To 02/28/1986

# FIRST YEAR TERRA DAILY GLOBAL OLR

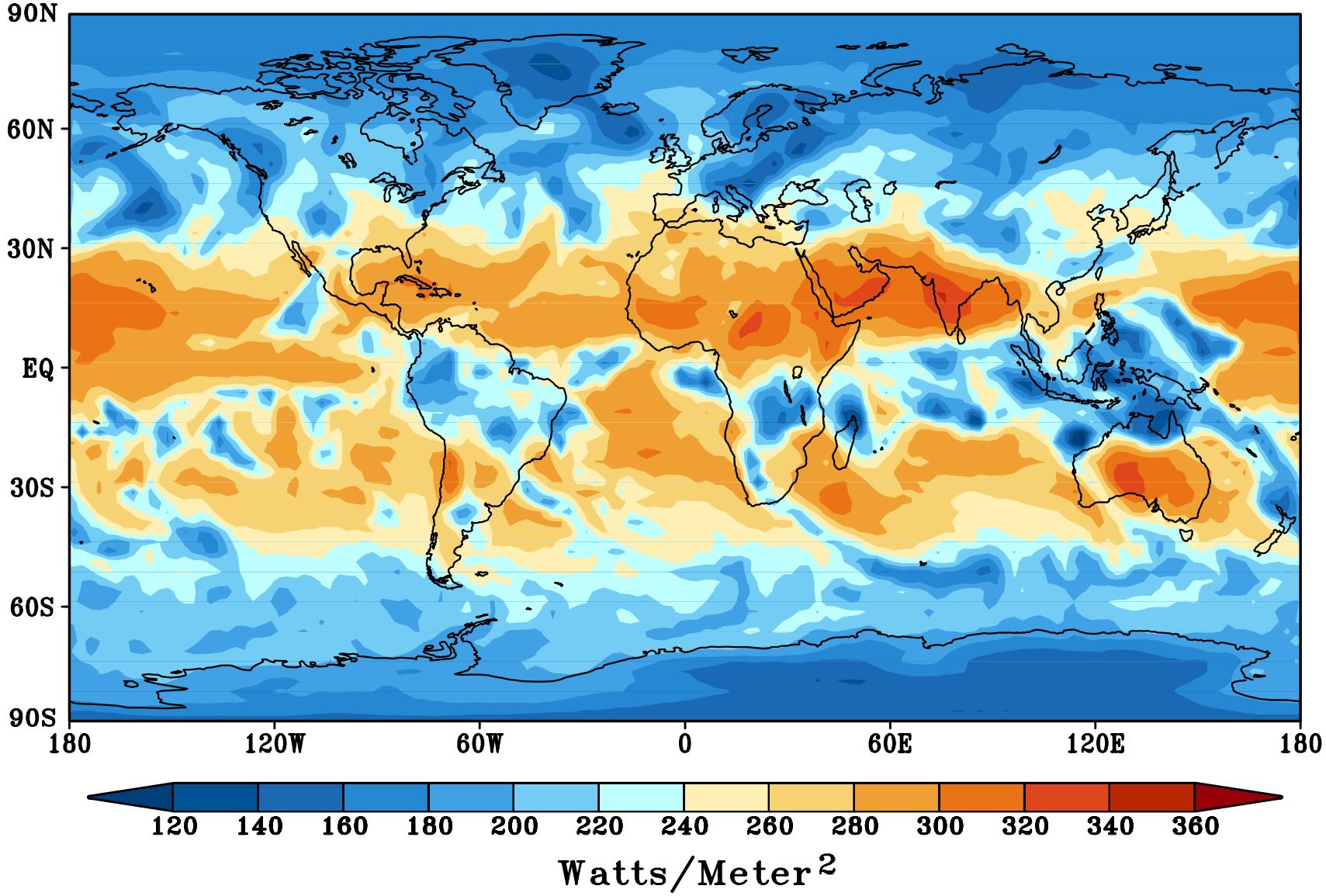
- Produce Terra Daily Mean Regional OLR Animation Using 365 Daily Mean Terra OLR Maps.
- Captured Numbers Of Weather And Climate Features:

  - Tropical Convections
  - Mid-latitude Fronts
  - Hurricanes
  - Cyclones
  - Intertropical Convergence Zone (ITCZ)
  - South Pacific Convergence Zone (SPCZ)
  - Dry/Hot Desert Regions Of Subtropics (Oceans And Lands)
  - Extreme Cold Regions Of The Poles

# Earth Outgoing Longwave Radiation

## CERES Instrument on NASA EOS Terra Satellite

## Date: 03/01/2000



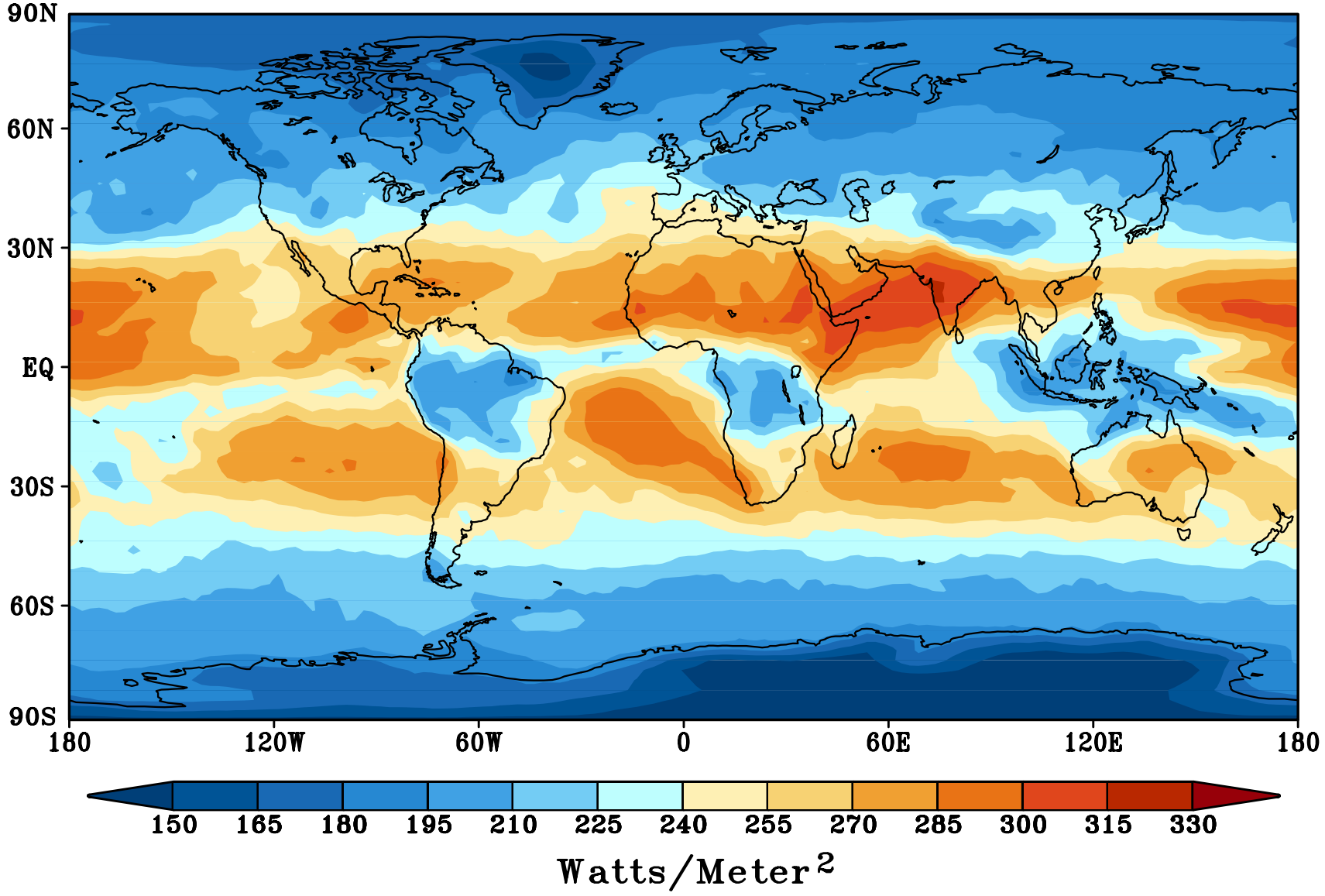
# FIRST YEAR TERRA MONTHLY GLOBAL FLUXES

- Produce Terra Monthly Mean Regional Animations Using 12 Monthly Mean Maps Of Longwave, Shortwave, And Net Radiation.
- Captured Numbers Of Climate Features:
  - Annual Migration Of ITCZ, Subtropical Deserts, And Mid-Latitude Zones.
  - Tropical Hot Spots Over Lands And Pacific Warm Pool.
  - Stratiform Clouds Off the West Cost Of Major Continents.
  - Cooling Effects OF The Major Deserts And The Poles.
- Computed Monthly Zonal And Monthly Global Mean Values.

# Earth Outgoing Longwave Radiation

## CERES Instrument on NASA EOS Terra Satellite

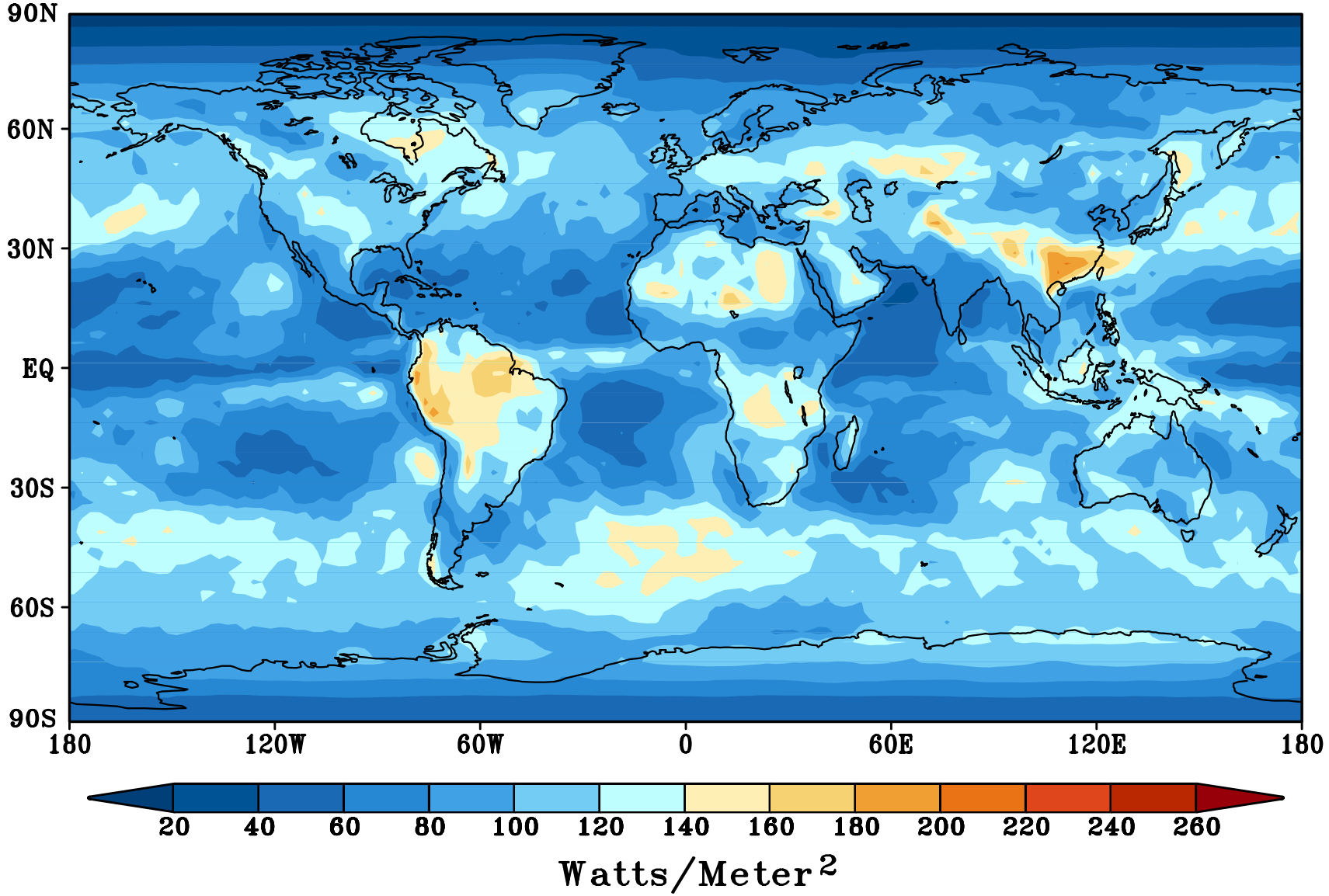
## Month: 03/2000



# Earth Reflected Shortwave Radiation

## CERES Instrument on NASA EOS Terra Satellite

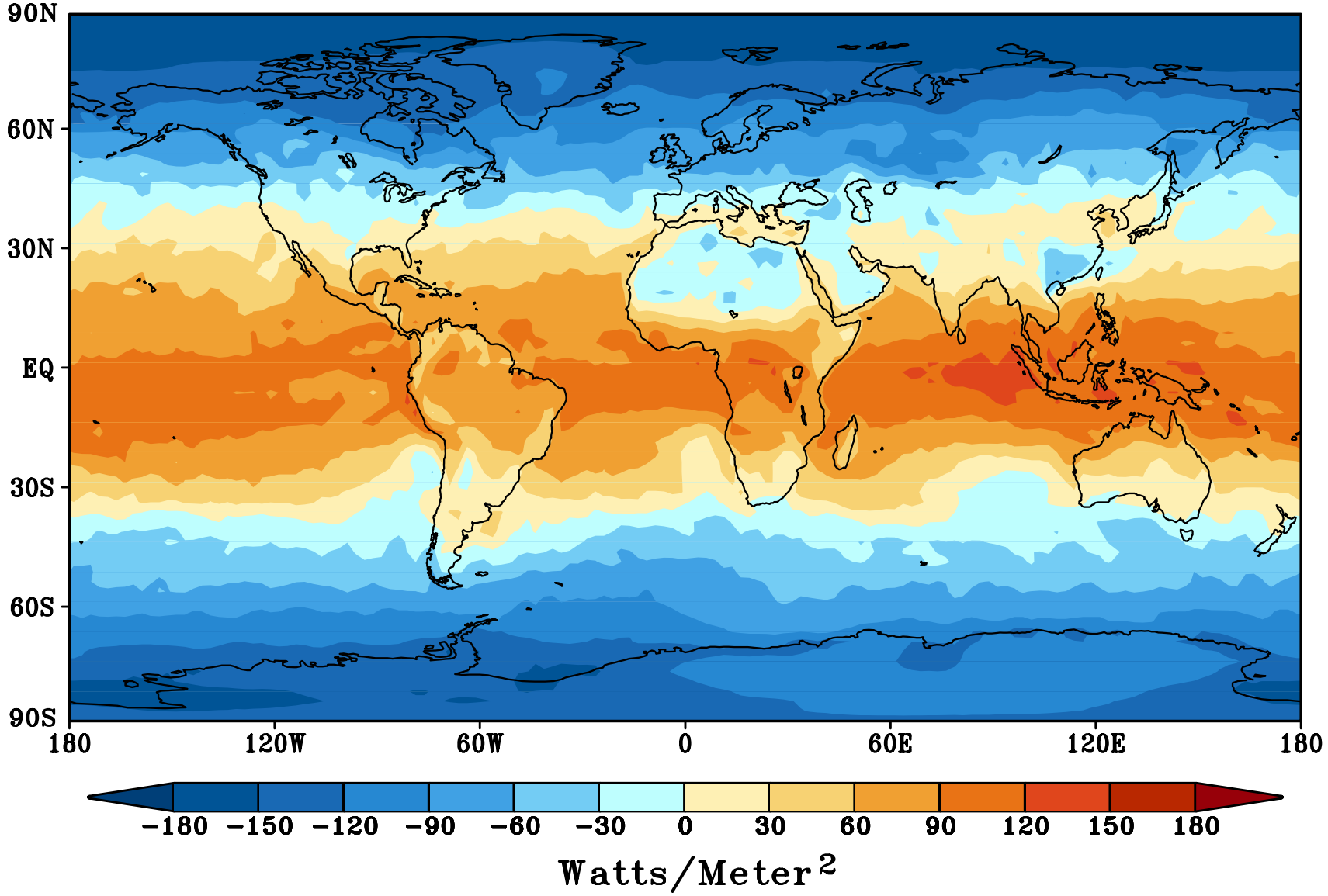
## Month: 03/2000

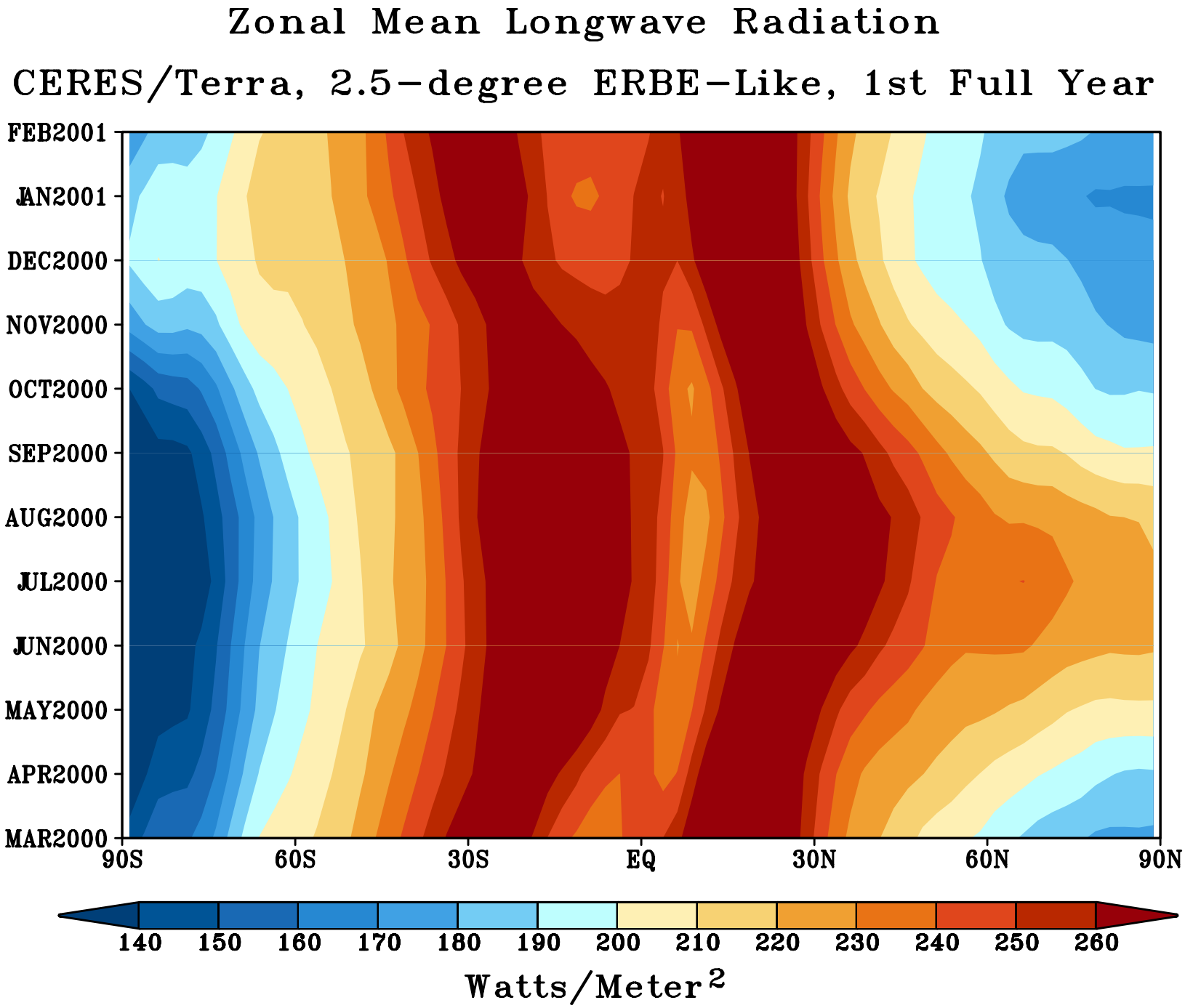


# Earth Net Radiation

## CERES Instrument on NASA EOS Terra Satellite

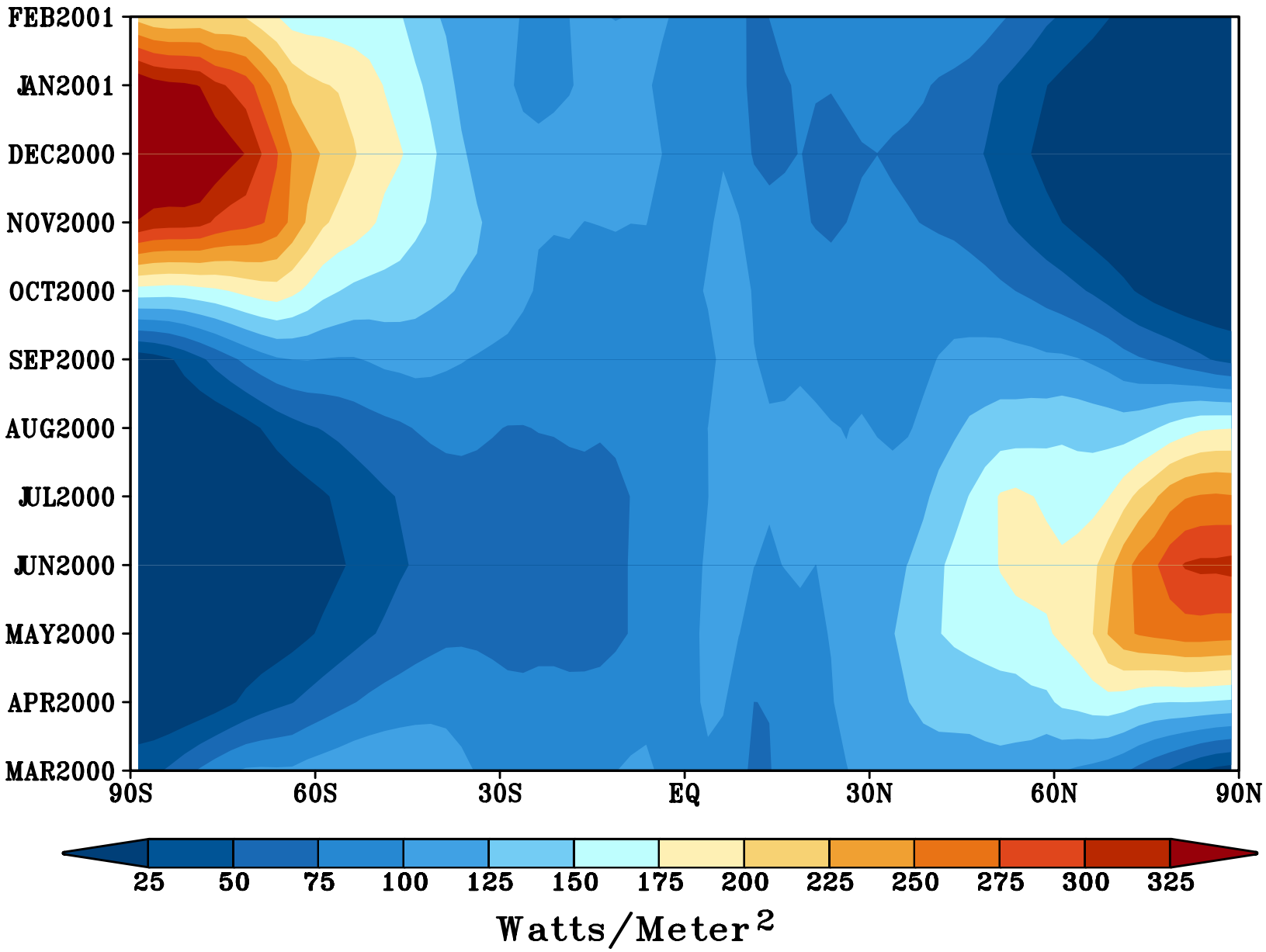
## Month: 03/2000

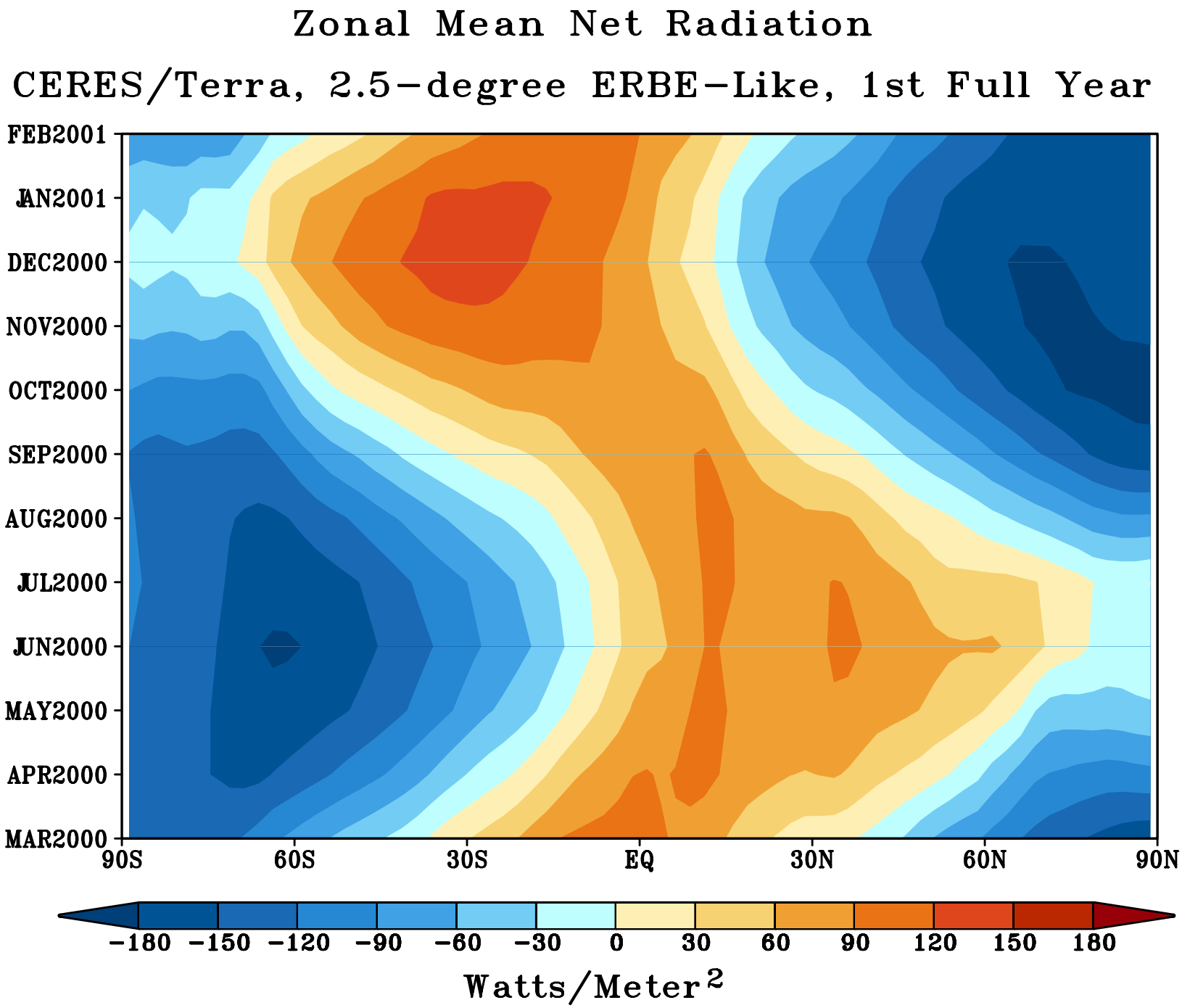



Zonal Mean Longwave Radiation
CERES/Terra, 2.5-degree ERBE-Like, 1st Full Year
FEB2001
JAN2001
DEC2000
NOV2000
OCT2000
SEP2000
AUG2000
JUL2000
JUN2000
MAY2000
APR2000
MAR2000
90S
60S
30S
EQ
30N
60N
90N
140
150
160
170
180
190
200
210
220
230
240
250
260
Watts/Meter2

# Zonal Mean Shortwave Radiation

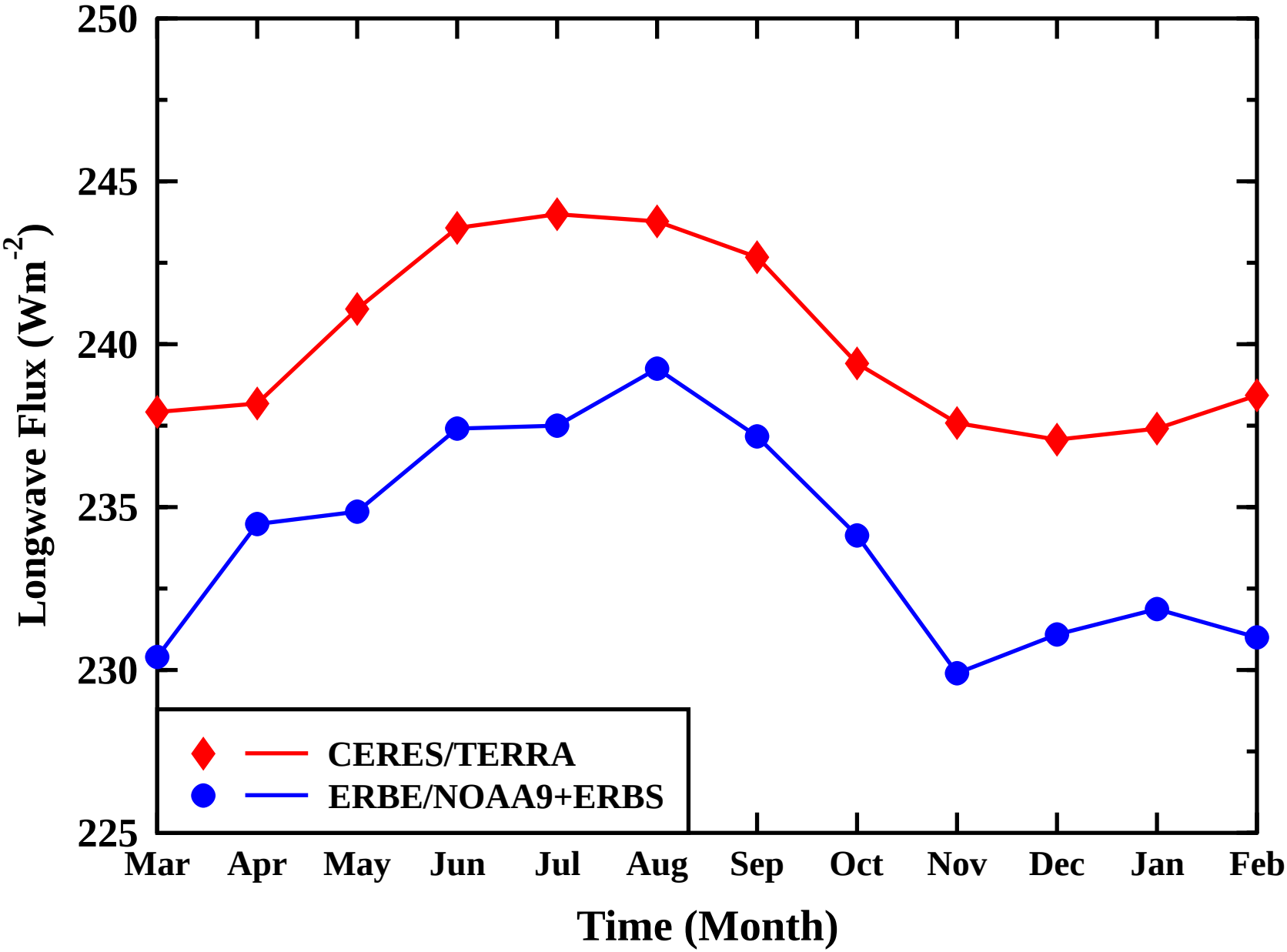
## CERES/Terra, 2.5-degree ERBE-Like, 1st Full Year

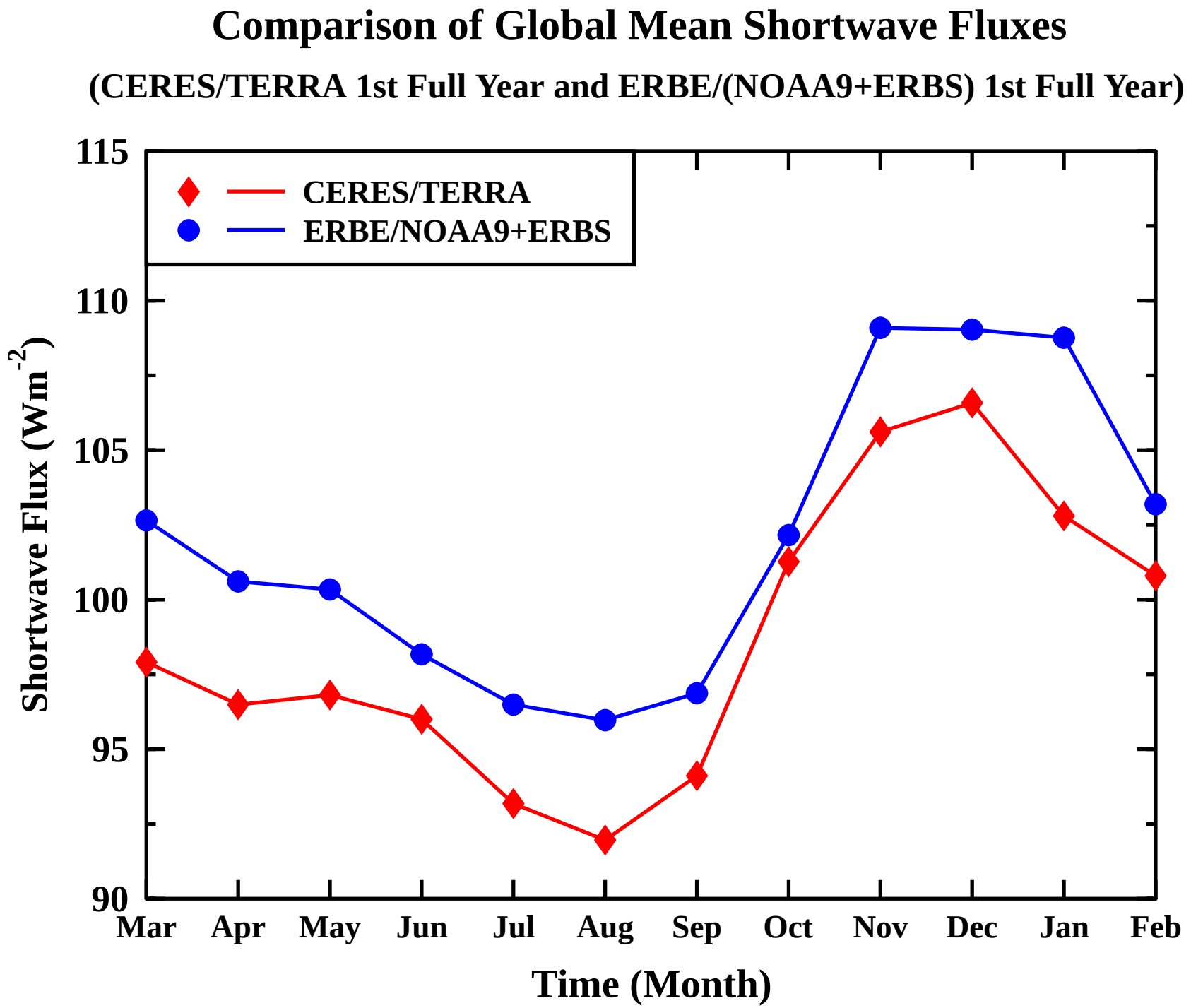


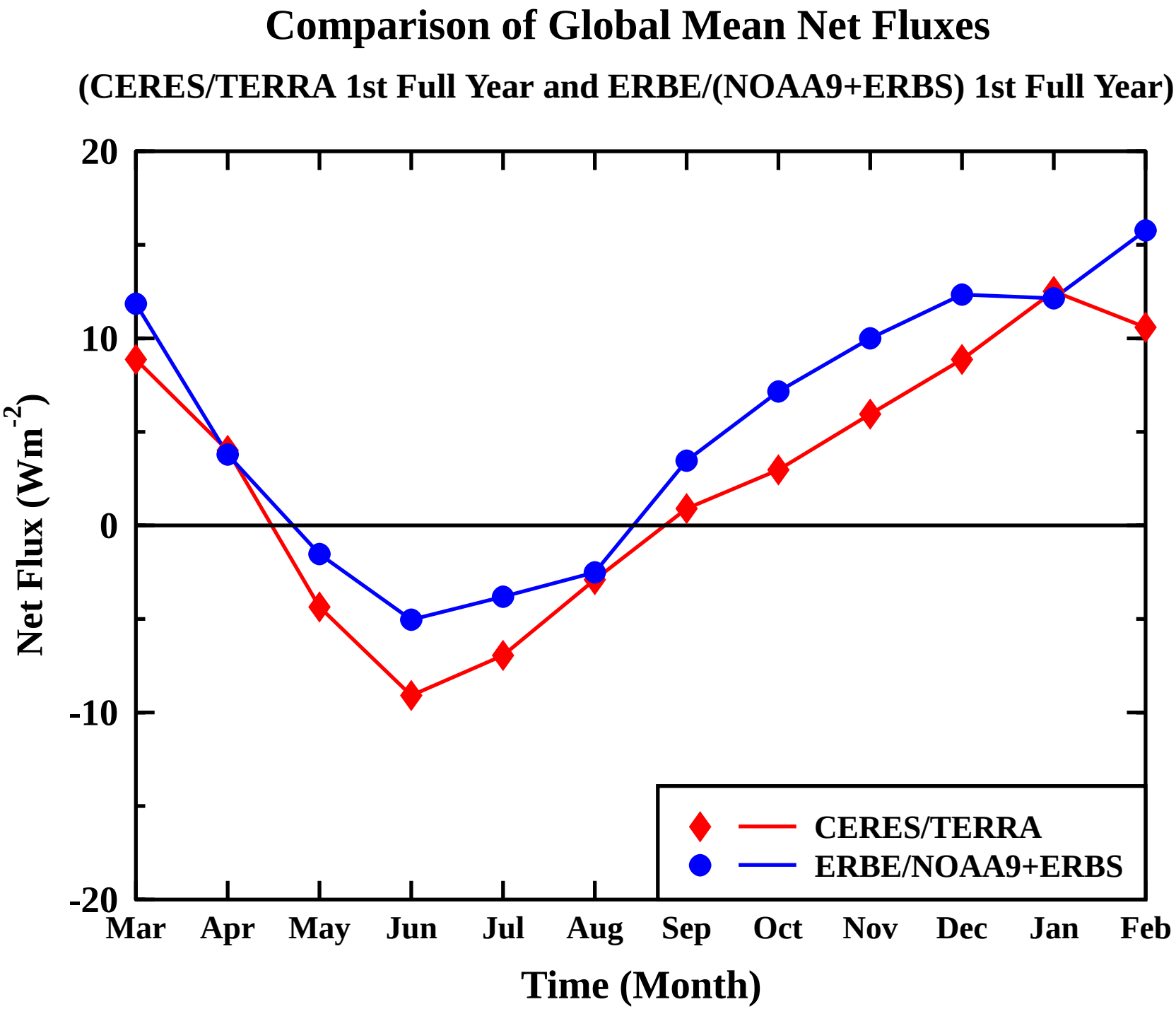

Zonal Mean Net Radiation
CERES/Terra, 2.5-degree ERBE-Like, 1st Full Year
FEB2001
JAN2001
DEC2000
NOV2000
OCT2000
SEP2000
AUG2000
JUL2000
JUN2000
MAY2000
APR2000
MAR2000
90S
60S
30S
EQ
30N
60N
90N
-180 -150 -120 -90 -60 -30 0 30 60 90 120 150 180
Watts/Meter2

# Comparison of Global Mean Longwave Fluxes

## (CERES/TERRA 1st Full Year and ERBE/(NOAA9+ERBS) 1st Full Year)

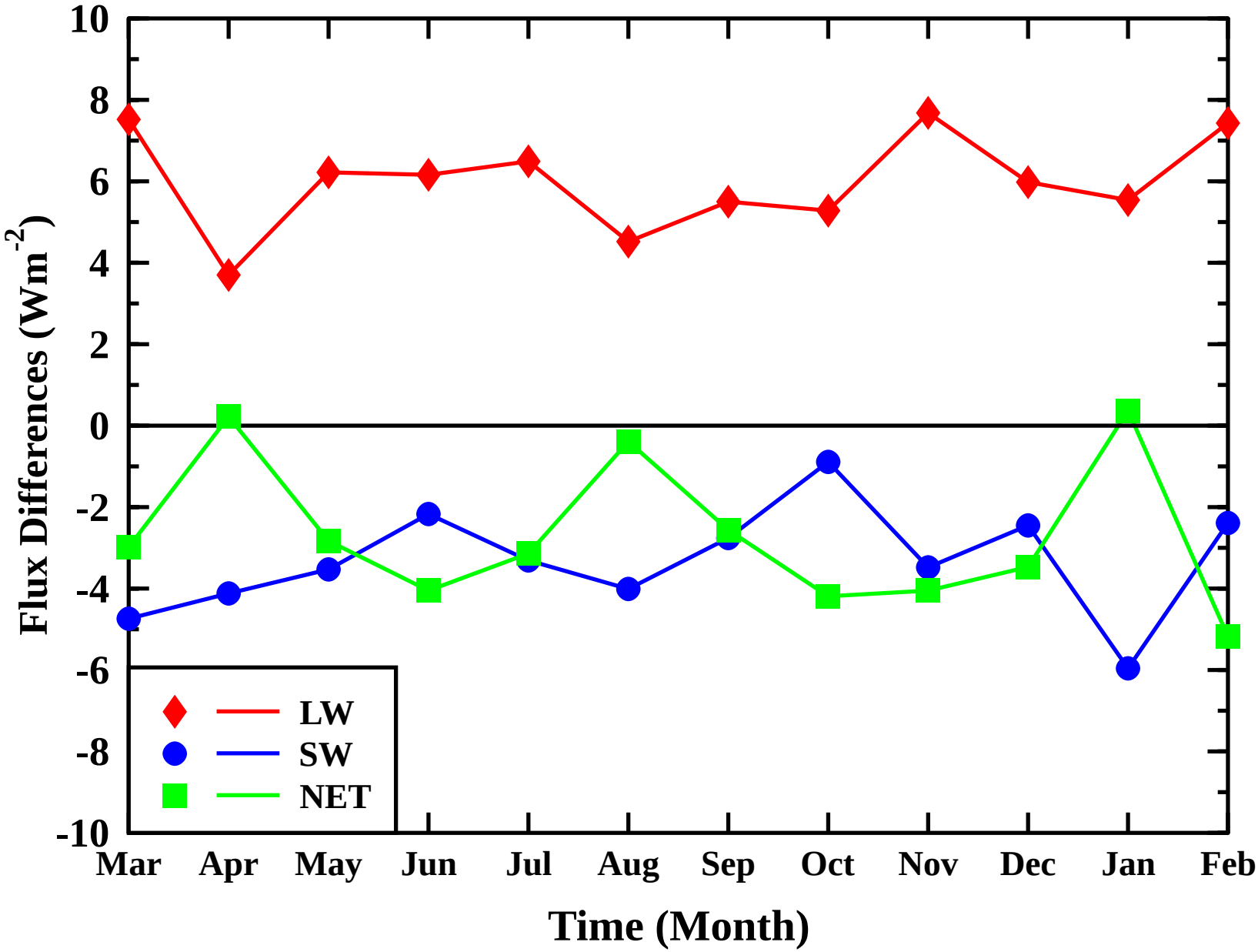



Comparison of Global Mean Shortwave Fluxes
(CERES/TERRA 1st Full Year and ERBE/(NOAA9+ERBS) 1st Full Year)
CERES/TERRA
ERBE/NOAA9+ERBS
Shortwave Flux (Wm-2)
115
110
105
100
95
90
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Time (Month)

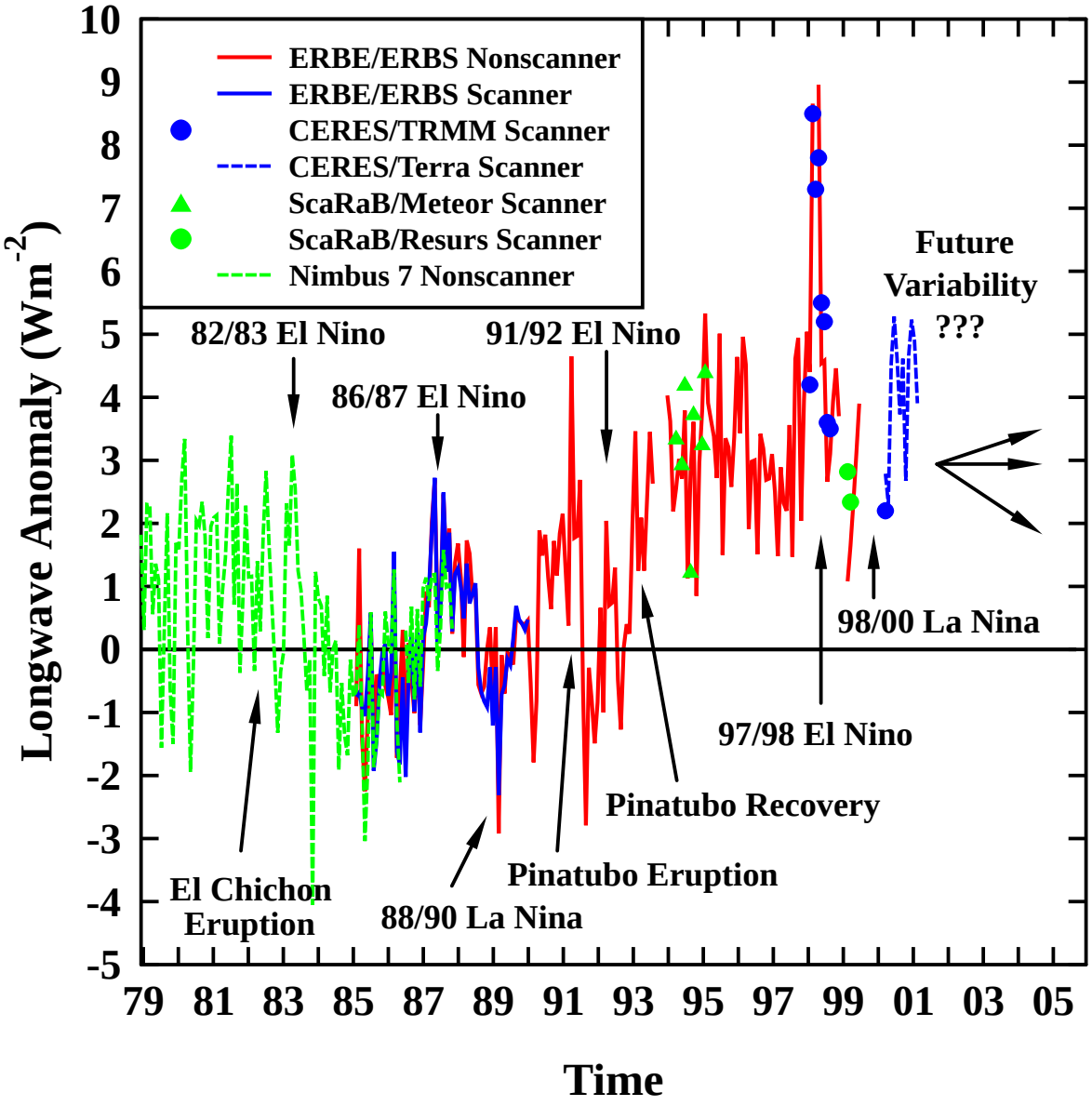

Comparison of Global Mean Net Fluxes
(CERES/TERRA 1st Full Year and ERBE/(NOAA9+ERBS) 1st Full Year)
20
10
0
-10
-20
Net Flux (Wm-2)
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Time (Month)
CERES/TERRA
ERBE/NOAA9+ERBS

# Time Series of Global Mean Flux Differences

## (CERES/TERRA 1st Full Year Minus ERBE/(ERBS+NOAA9) 1st Full Year)



# Decadal Variability in Tropical Mean (20S - 20N) Longwave Radiation from 7 Different Broadband Instruments for 1979 - 2001 Anomalies Referenced to 1985 through 1989 Baseline



# FIRST YEAR TERRA ANNUAL GLOBAL FLUXES

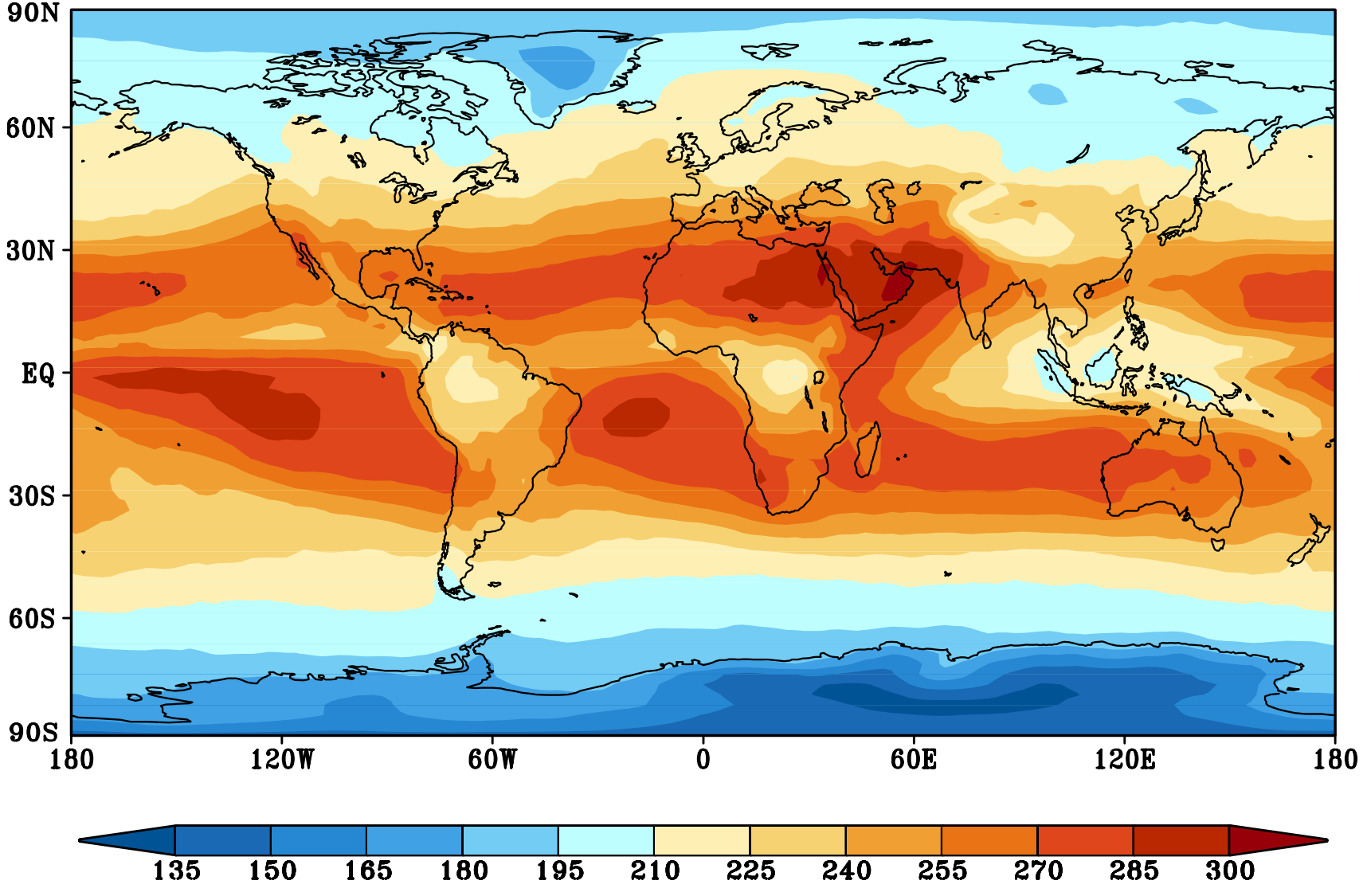
- Computed Annual Regional, Annual Zonal, And Annual Global Mean Values Of Longwave, Shortwave, Net, And Albedo.

| Annual Global Mean | CERES/TERRA ($Wm^{-2}$) | ERBE/ NOAA9+ERBS ($Wm^{-2}$) | CERES - ERBE ($Wm^{-2}$) |
|---|---|---|---|
| LW | 240.1 | 234.1 | 6.0 |
| SW | 98.6 | 101.9 | -3.3 |
| NET | 2.6 | 5.3 | -2.7 |
| ALB | 28.90% | 29.87% | -0.97% |

# Longwave Radiation

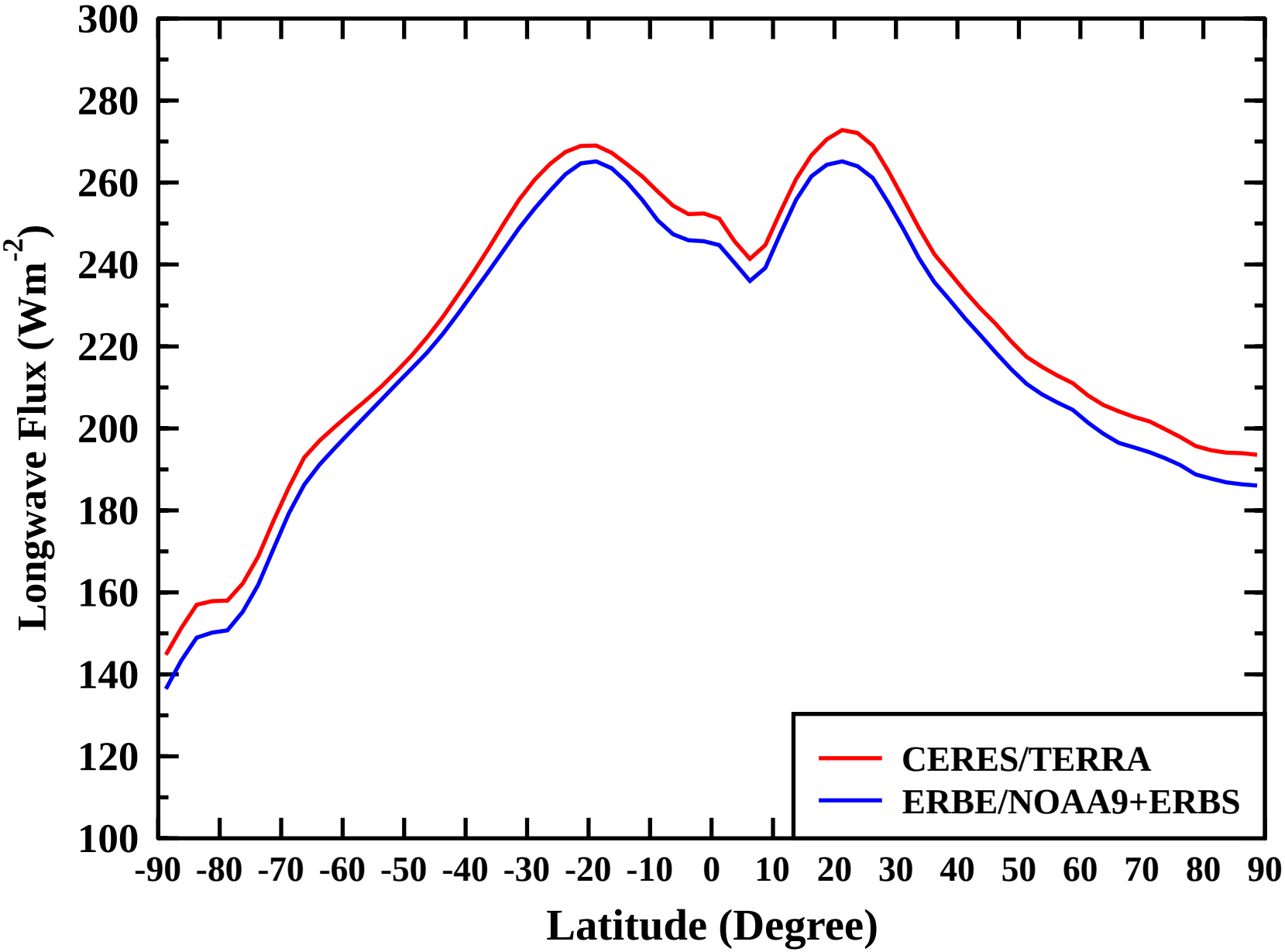
## CERES/Terra, 2.5-degree ERBE-Like, 1st Full Year Mean

Global Mean (90S-90N) = 240.1 $Wm^{-2}$



# Comparison of Zonal Mean Longwave Fluxes

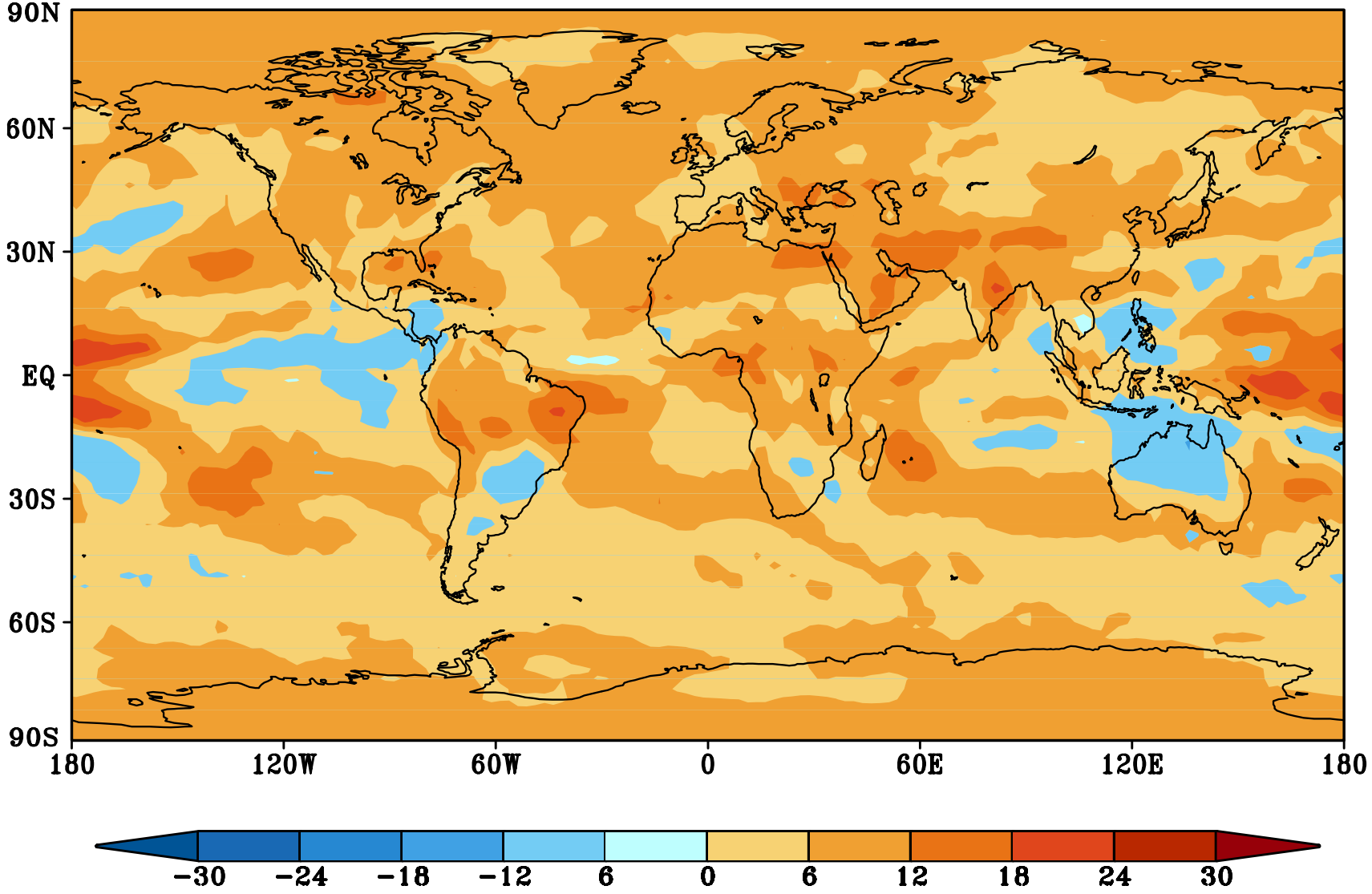
## (CERES/TERRA 1st Full Year and ERBE/(NOAA9+ERBS) 1st Full Year)



# Longwave Radiation Differences

## CERES/Terra Minus ERBE/ERBS+NOAA9, 1st Full Year Mean

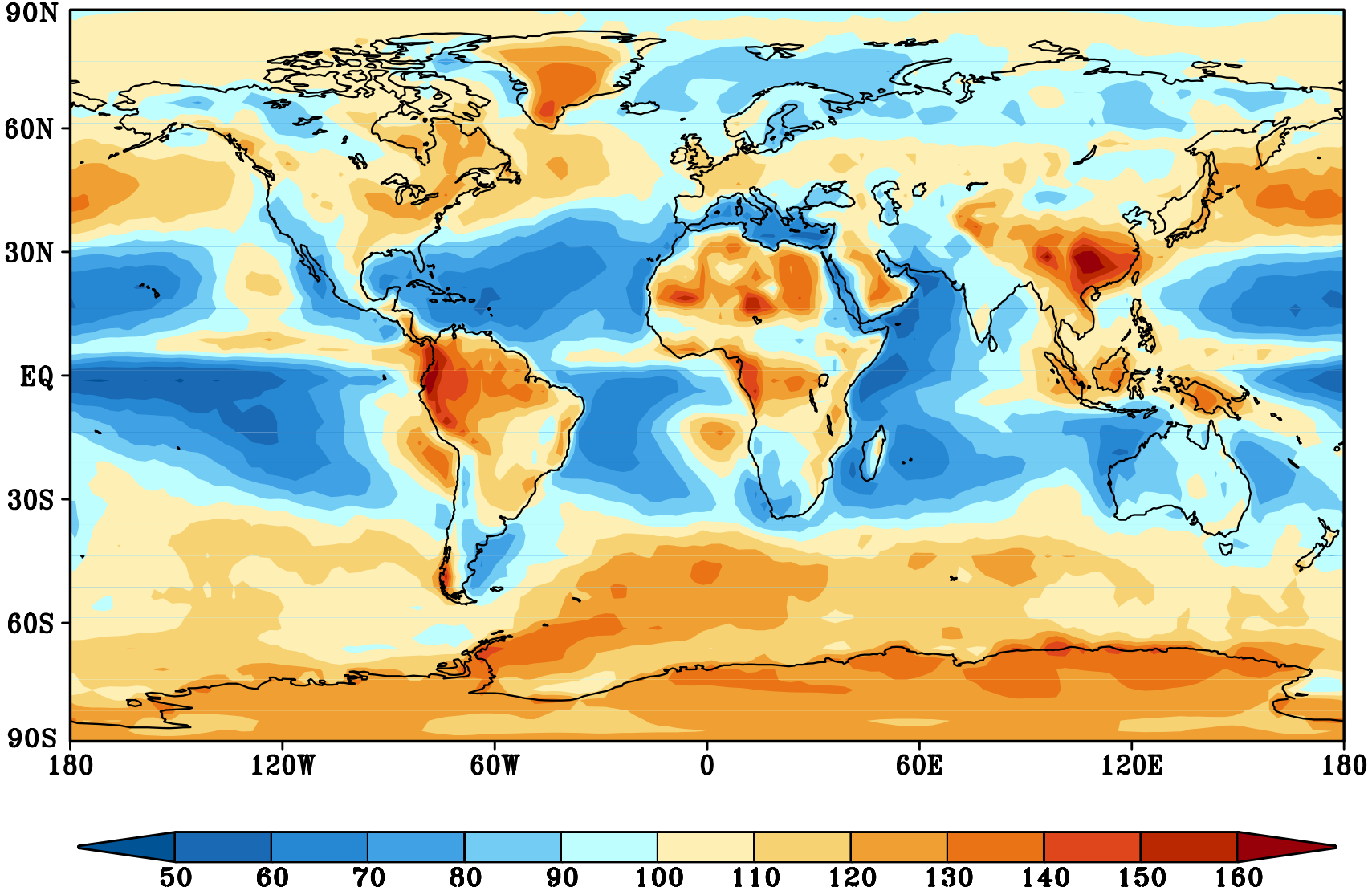
Global Mean (90S–90N) = 6.0 $Wm^{-2}$

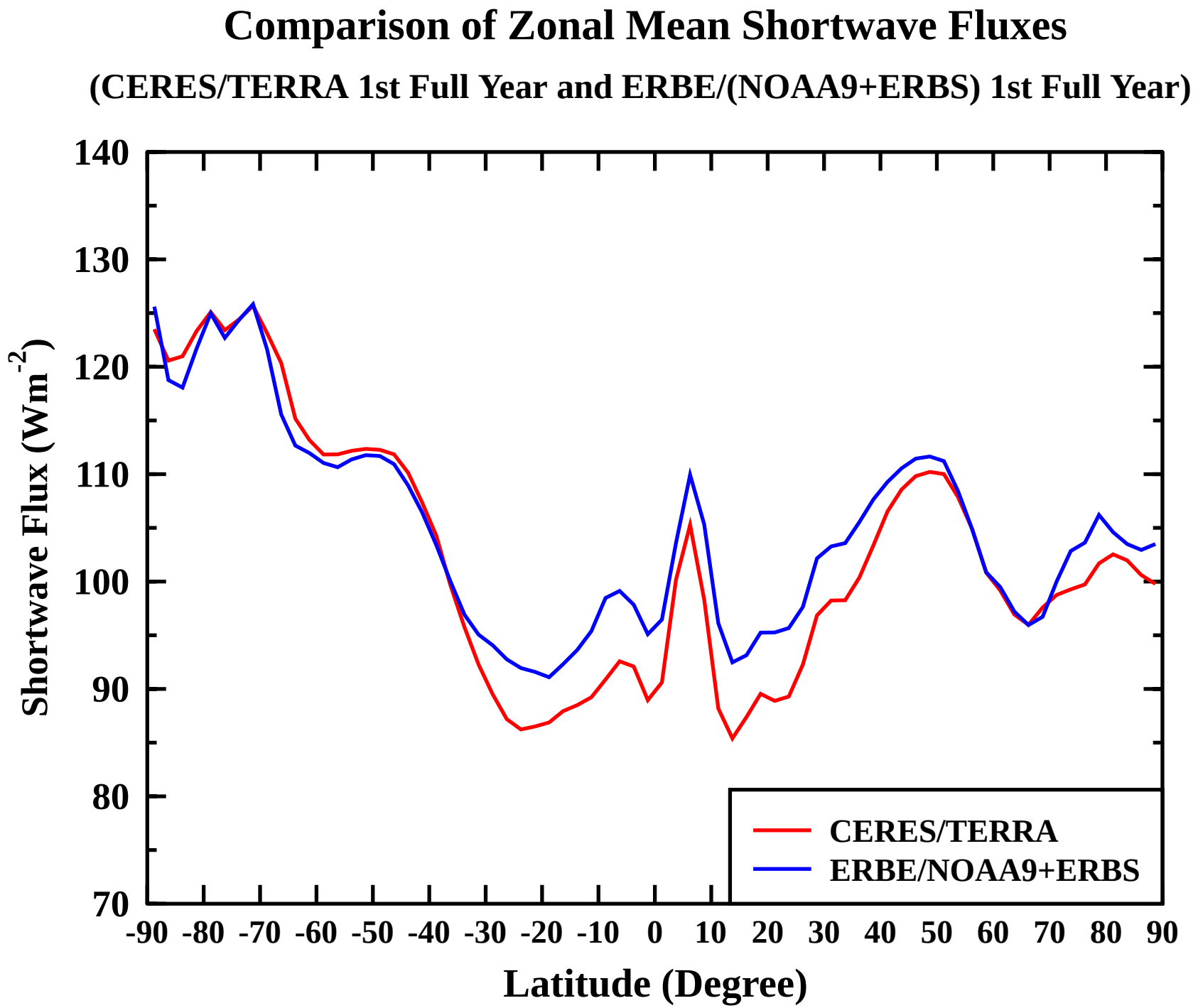


# Shortwave Radiation

## CERES/Terra, 2.5-degree ERBE-Like, 1st Full Year Mean

Global Mean (90S-90N) = 98.6 $Wm^{-2}$

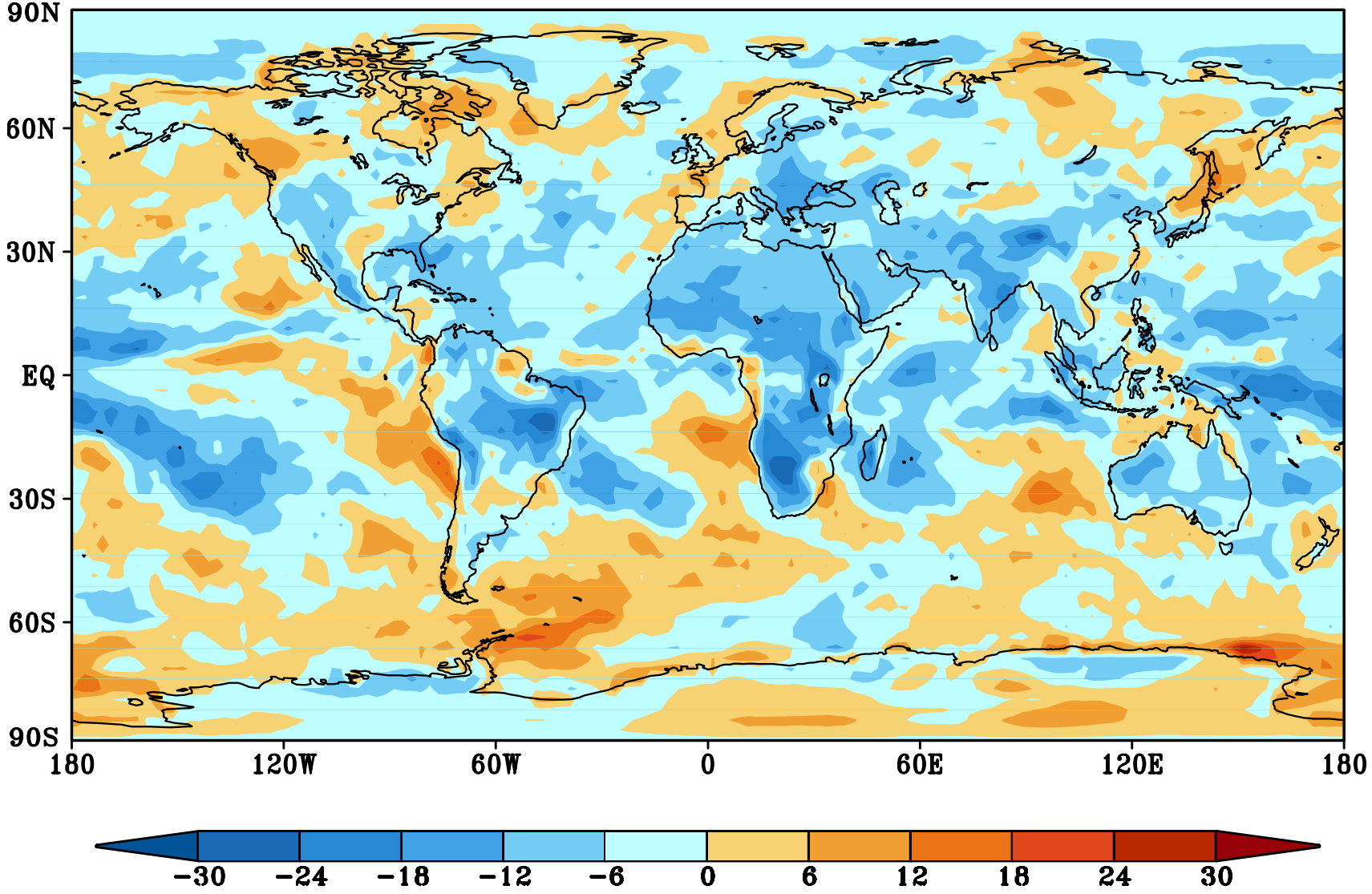



Comparison of Zonal Mean Shortwave Fluxes
(CERES/TERRA 1st Full Year and ERBE/(NOAA9+ERBS) 1st Full Year)
Shortwave Flux (Wm-2)
140
130
120
110
100
90
80
70
-90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90
Latitude (Degree)
CERES/TERRA
ERBE/NOAA9+ERBS

# Shortwave Radiation Differences

## CERES/Terra Minus ERBE/ERBS+NOAA9, 1st Full Year Mean

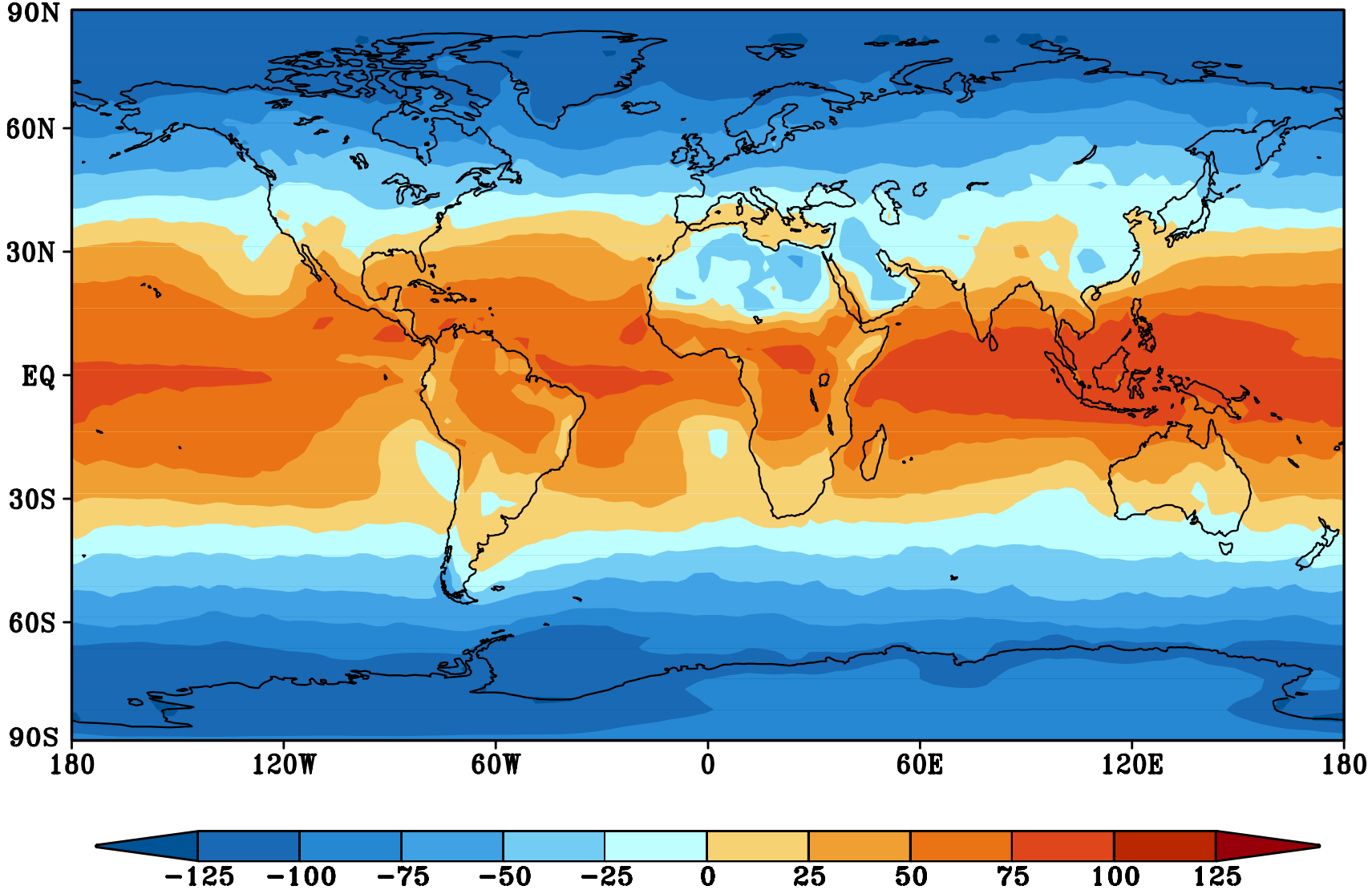
Global Mean (90S–90N) = −3.3 $Wm^{-2}$



# Net Radiation

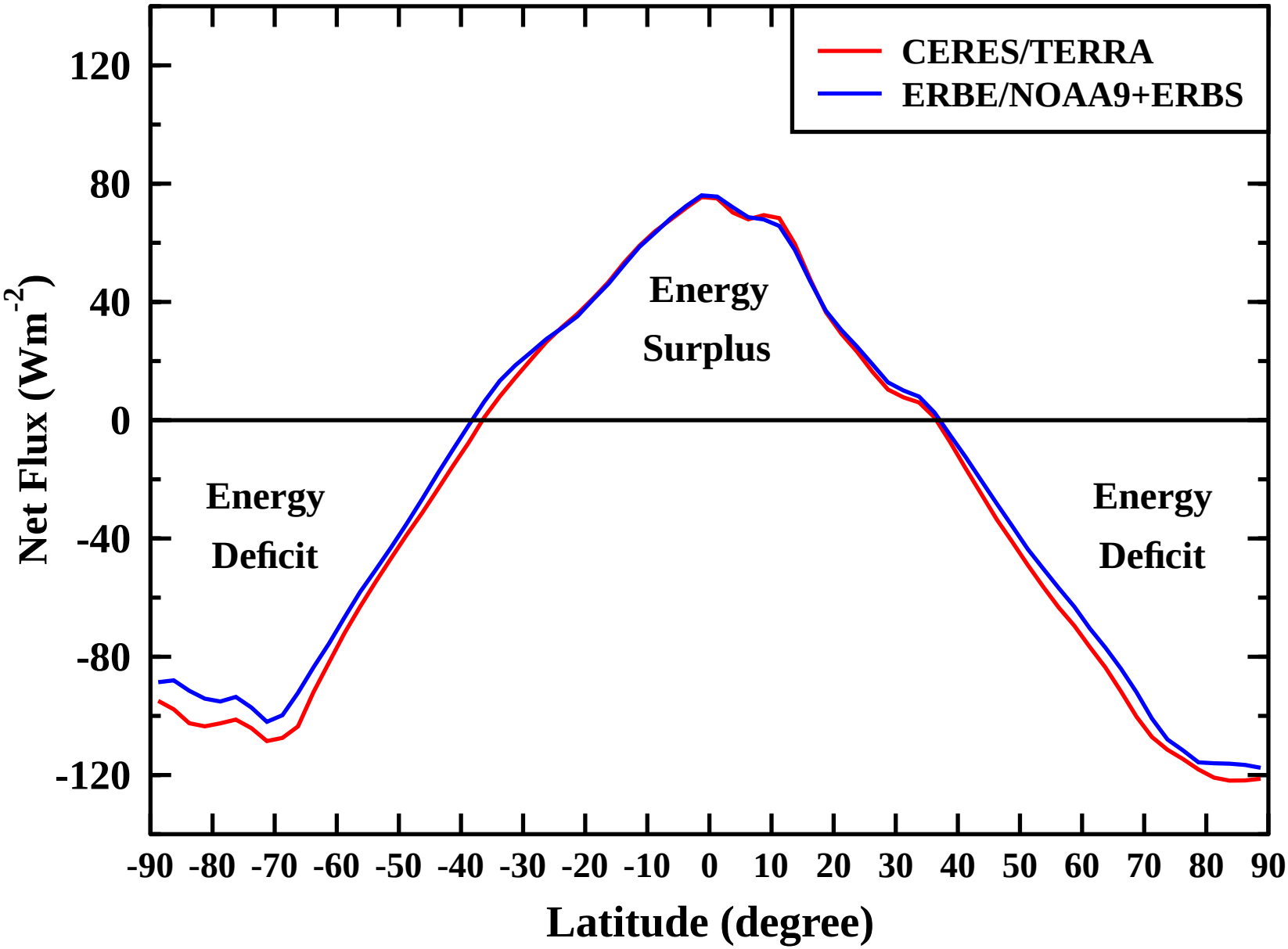
## CERES/Terra, 2.5-degree ERBE-Like, 1st Full Year Mean

Global Mean (90S-90N) = 2.6 $Wm^{-2}$



# Comparison of Zonal Mean Net Fluxes

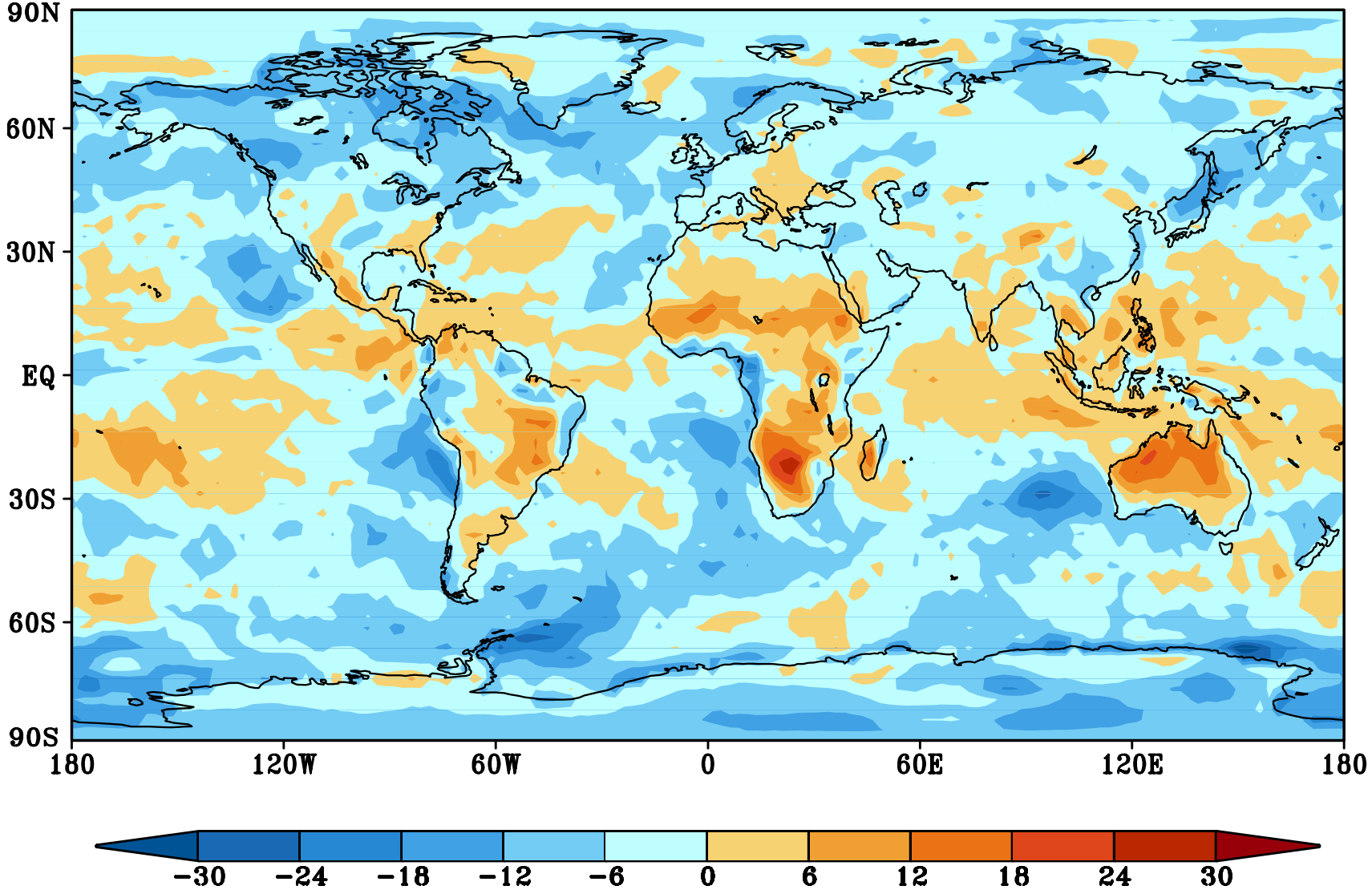
## (CERES/TERRA 1st Full Year and ERBE/(NOAA9+ERBS) 1st Full Year)

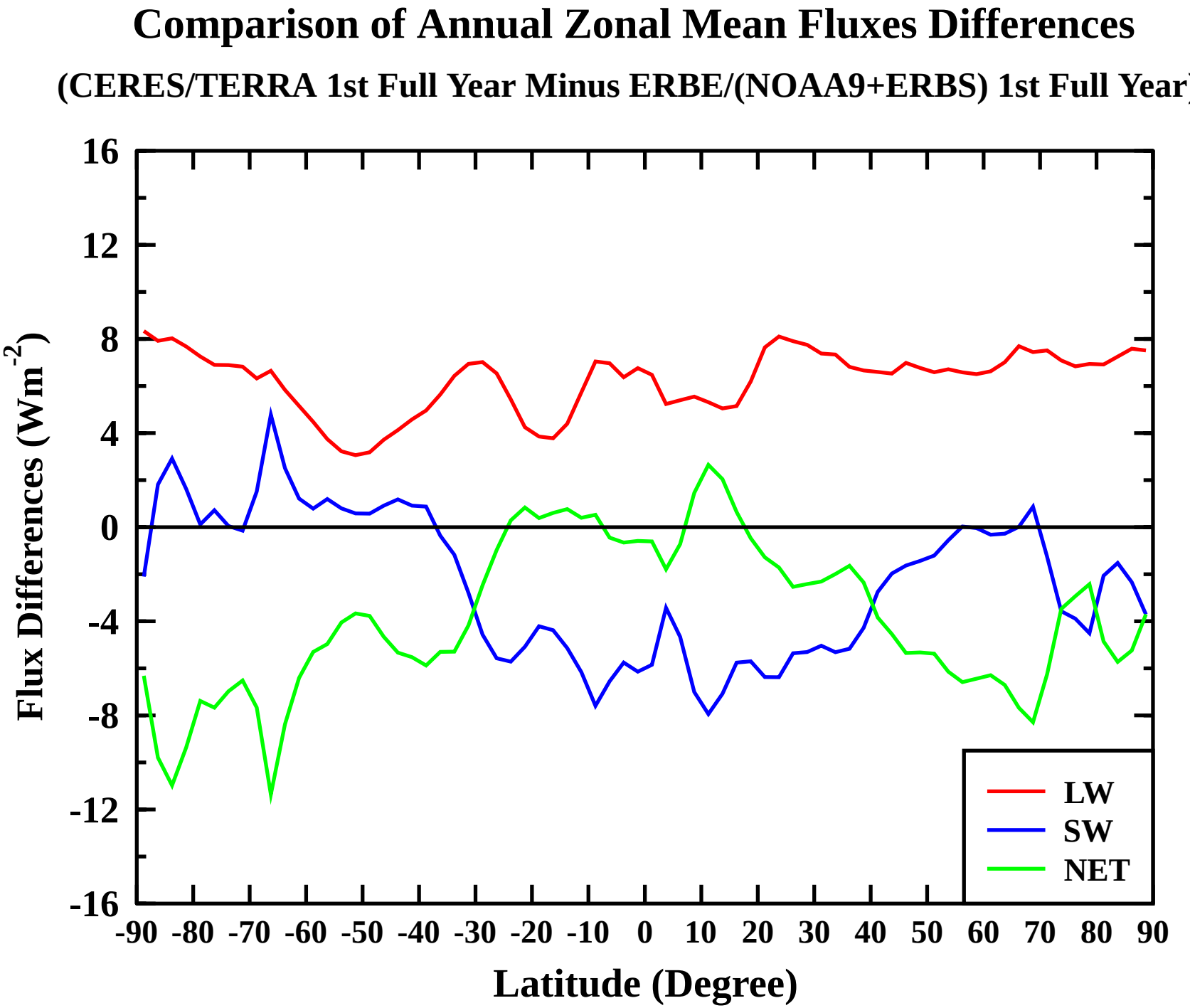


# Net Radiation Differences

## CERES/Terra Minus ERBE/ERBS+NOAA9, 1st Full Year Mean

Global Mean (90S–90N) = −2.7 $Wm^{-2}$




Comparison of Annual Zonal Mean Fluxes Differences
(CERES/TERRA 1st Full Year Minus ERBE/(NOAA9+ERBS) 1st Full Year)
Flux Differences (Wm-2)
16
12
8
4
0
-4
-8
-12
-16
-90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90
Latitude (Degree)
LW
SW
NET

# SUMMARY

- The First Full Year of CERES/TERRA Global Fluxes Shows Many Interesting Features, Ranging From Daily To Monthly To Annual Time Scale.
- The CERES/Terra Annual Global Mean LW/SW Fluxes Are High/Lower Than Those From ERBE/NOAA9+ERBS, Respectively.
- The CERES/Terra Annual Global Mean Net Fluxes Are Closer To Radiative Equilibrium Than Those From ERBE/NOAA9+ERBS.
- While The CERES/Terra Annual Regional Mean LW Fluxes Are Higher Almost Everywhere Than ERBE Fluxes, The Annual Regional Mean SW And Net Fluxes Show Many Interesting Spatial Differences.